

# Pioneer Farm Agroecosystems Research

Dennis Busch, Ph.D., Senior Scientist

Agroecosystems Research Overview  
Speaker's Task Force on Water Quality  
May 8, 2019 Lancaster WI



UNIVERSITY OF WISCONSIN  
**PLATTEVILLE**  
PIONEER FARM

# Overview



- Background
- Investment in Research Infrastructure
- Impact of the Data
- Leveraging The Investment

# Wisconsin Agricultural Stewardship Initiative



- Ben Brancel, Secretary DATCP
- May 9, 2000 WASI Announced
- Objective: Evaluate impact of farm management practices on environmental and economic sustainability.

# Producer Involvement

## □ Farmer Steering Committee

- ▣ Mark Riechers    Josh and Gretchen Kamps
- ▣ Tom Kunkel        Kyle Vesperman        Shannon Wolf
- ▣ Tom Evenstad    John Ihm                Greg VanNatta

## □ Farm-Led Watershed Groups

- ▣ Lafayette Ag Stewardship Alliance
- ▣ Jo Daviess County Soil and Water Health Coalition
- ▣ Grant County Farm Group

# Research Investment (\$5M)

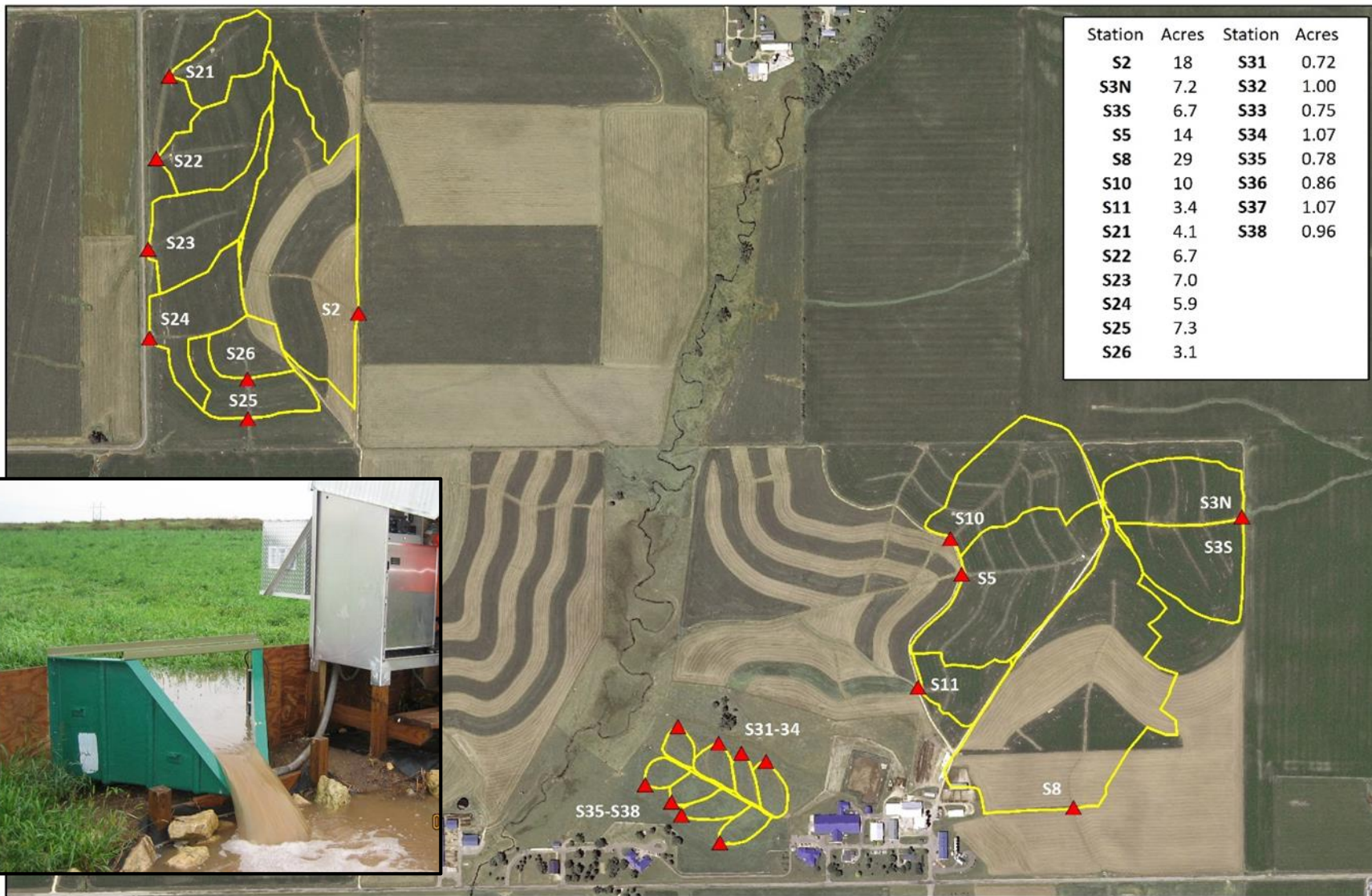
- EOF Surface-Water Runoff
  - ▣ 21 Sites/186 Site Years, \$4,350,00
- Perennial Stream Gauging/Hydrologic Observatory
  - ▣ 1 Site/5 Site Years, \$250,000
- Groundwater Monitoring Wells
  - ▣ 12 Wells/120 Site Years, \$360,000
- Undisturbed Soil Core Lysimeters
  - ▣ 16 Lysimeters/32 site years, \$128,000
- NRCS SCAN Meteorological Station, \$?



# Runoff Monitoring







UNIVERSITY OF WISCONSIN  
**PLATTEVILLE**

### Pioneer Farm Research Runoff Infrastructure

Drainage Basin Boundaries

Runoff Monitoring Stations

0 500 1,000 1,500 Feet



Cartography: Randy Mentz  
November 13, 2014

# Impact of Surface-Water Data

```
graph TD; A[Monitoring Infrastructure] --> B[Data]; B --> C[Model Development / Validation]; C --> D[Decision Making Tool]; D --> E[Changes in Farm Management];
```

Monitoring Infrastructure

Data

Model Development / Validation

Decision Making Tool

Changes in Farm Management



# Example: WI Phosphorus Index

- ❑ Incorporated in the SnapPlus program
- ❑ Calculates Potential Soil and Phosphorus Runoff
- ❑ 3.3 million acres in WI (36% of Cropland)
- ❑ Supports Adaptive Management Programs
- ❑ Assists with Targeting Conservation Practices

<https://snapplus.wisc.edu/>

# Example: Runoff Risk Advisory

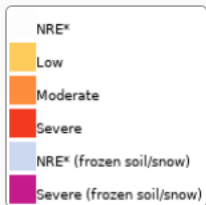


## Runoff Risk Advisory Forecast Wisconsin Manure Management Advisory System

[MMAS Home](#) | [Runoff Risk Advisory Forecast](#) | [SnapMaps 590/NR243 Maps](#) | [DATCP Geodata](#) | [Contact/Help](#)

### Map Legend

#### Runoff Risk



#### \*NRE: No Runoff Expected

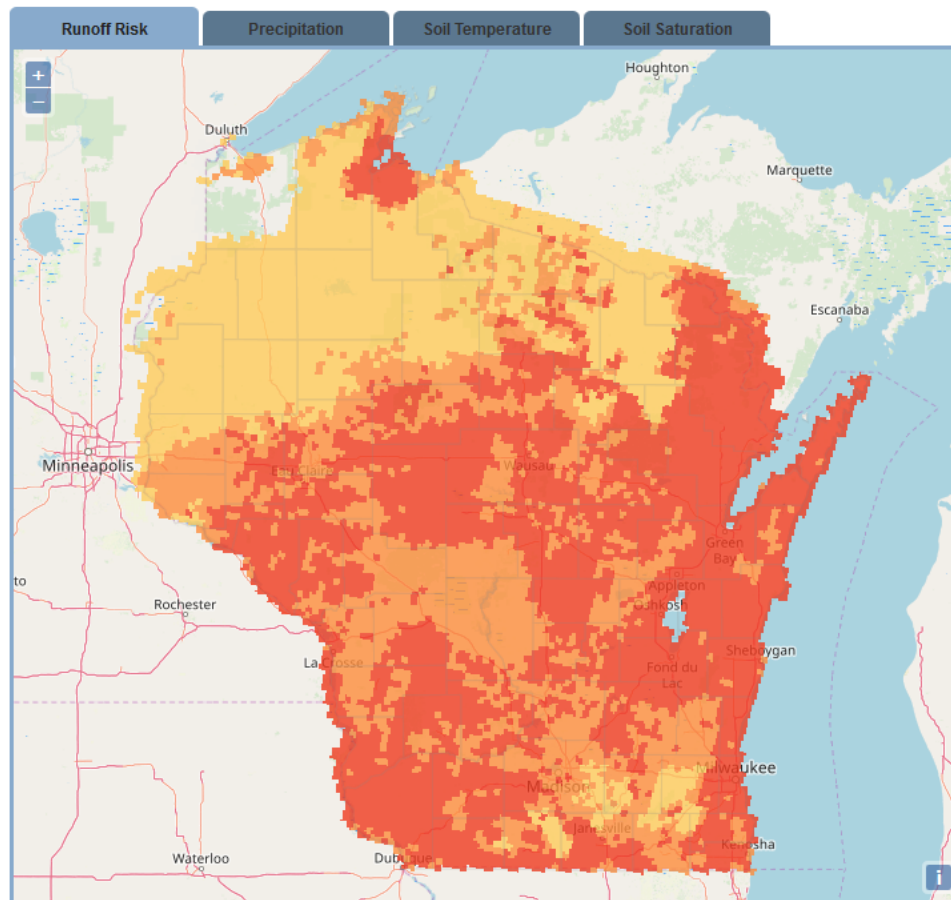
Shows the *highest* risk within the forecast period 3 days (except when frozen soils or snow are present, when it is 10 days).

### About the Forecast

Using the map  
What is the RRAF telling me?  
High risk: Need to spread?  
High risk: Can a farmer spread?  
Previous map snapshots  
Check out our new video!  
News

### Additional Resources

NM plans & NRCS 590 std.  
Information for CAFOs  
SnapPlus NM software



Forecast updated: May 7 6:58 AM

### Map Controls

**Double-click** map to zoom

**Click** on map for details

**Move slider** to change dates



Map displays the **highest** runoff risk forecast from 5/7 to 5/9 *except when frozen soils or snow are present*, when it displays the highest risk anticipated within the entire 10-day forecast period.

### Map Details

The National Weather Service uses precipitation, temperature, soil moisture, and landscape characteristics data to run the SAC-HTET model, which generates this map.

# Impact of Surface-Water Data

- APLE (Annual Phosphorus Loss Estimator)

<https://www.ars.usda.gov/midwest-area/madison-wi/us-dairy-forage-research-center/docs/aple-homepage/>

- Barnyard Runoff Model

<https://extension.soils.wisc.edu/wcmc/a-new-tool-for-estimating-phosphorus-loss-from-cattle-barnyards-and-outdoor-lots/>

- SWAT: Soil and Water Assessment Tool





Groundwater Monitoring Wells  
12 Installations  
in Cooperation with UW-Stevens Point

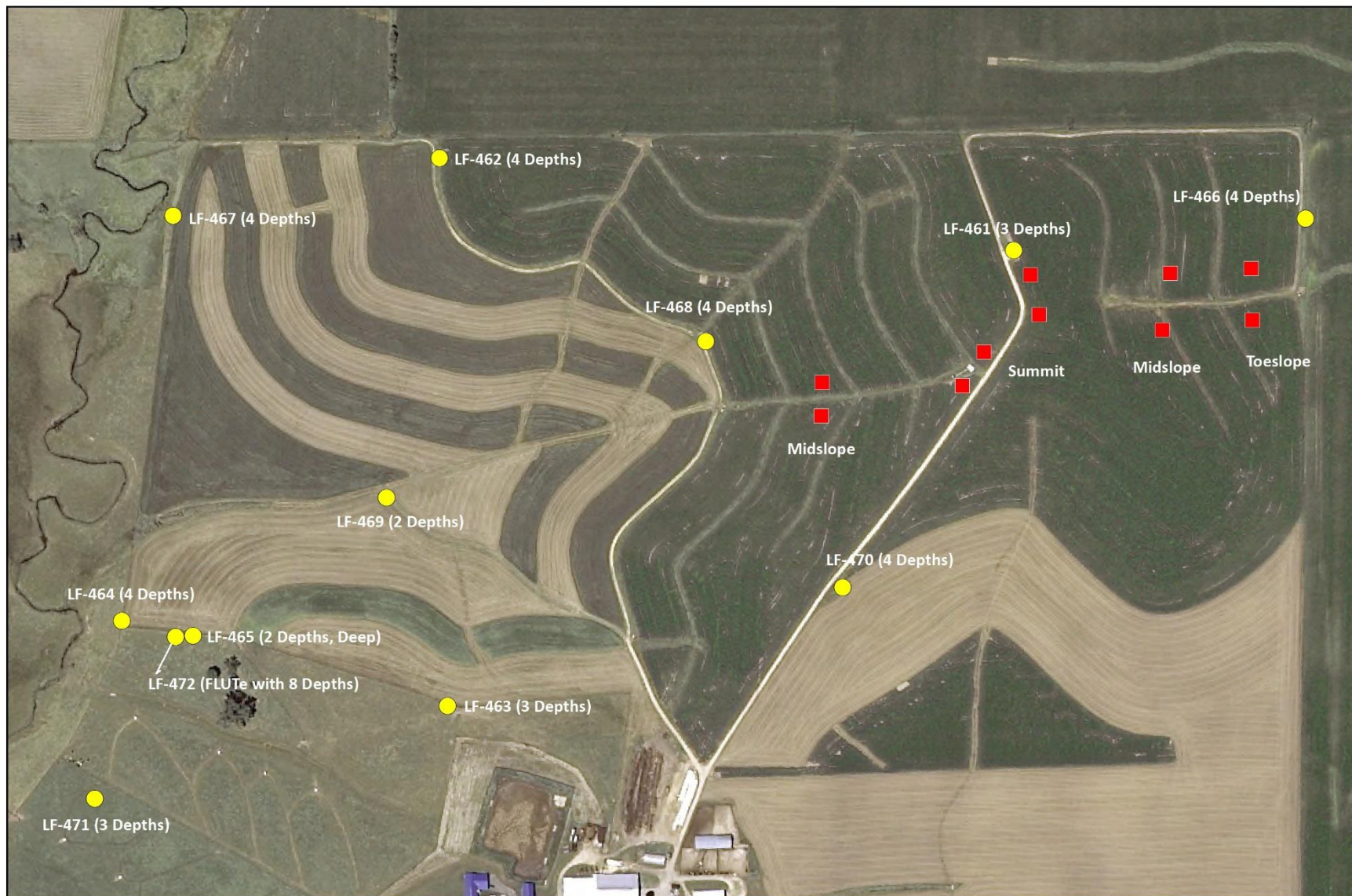




Undisturbed Soil Core Lysimeters  
16 installations  
In Cooperation with USDA/ARS







UNIVERSITY OF WISCONSIN  
**PLATTEVILLE**

## Pioneer Farm Research Groundwater Monitoring Infrastructure

■ Lysimeters    ● Monitoring Wells

0 200 400 600  
Feet



Cartography: Randy Mentz  
November 12, 2014



# Proposed Groundwater Research

**Investigating the relationship between crop nutrient management on groundwater nitrate and bacterial contamination in the Driftless Area of the Upper Mississippi River Basin.**

Dennis Busch<sup>1</sup>, Andrew Cartmill<sup>1</sup>, Tom Moorman<sup>2</sup>, Gary Feyereisen<sup>3</sup>, Francisco Arriaga<sup>4</sup>, and Paul McGinley<sup>5</sup>

<sup>1</sup>Univ. of WI-Platteville

<sup>2</sup>National Lab for Agriculture and the Environment, USDA / ARS

<sup>3</sup>Soil and Water Management Research Lab, USDA / ARS

<sup>4</sup>University of WI-Madison

<sup>5</sup>University of WI-Stevens Point

# Research Networks

## Long-Term Agroecosystems Research

- USDA ARS
- 18 Premier Research Sites
- Continental Scale
- Focus: Sustainable Intensification



## Global Farm Platform

- 9 Farm Platforms
- Global Scale
- Focus: Sustainable Intensification



# State Support for Research

## □ Historically

- Approximately \$300,000/year
- Leveraged with Federal Grants
- 6 Full-Time Personnel

## □ Currently

- Approximately \$5,000/year
- Leveraged Federal Grants
- 1.5 Full-Time Personnel



# Questions?

